

Ch. 1 Dimensional Analysis

. What is dimensional analysis?

- Dimensional analysis is a useful method that can be used to mathematically cancel out units in order to obtain a desired unit.

. **Conversion factors are useful for dimensional analysis** (conversion factors are ratios or mathematical relations used to convert one unit to another i.e. g/mol or 1 ft = 12 in)

SI unit prefixes

Prefix	mega	kilo	deci	centi	milli	micro	nano	pico
Symbol	M	k	d	c	m	μ	n	p
Value	10^6	10^3	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}

example: 1 g = 1000 mg

Common conversion factors

1 ft = 12 in	1 min = 60 s	1 mi = 1.609 km	1 mole = 6.02×10^{23} atoms (particles)
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. Practice

A Nissan GTR R35 has a top speed of 196 mph. Convert this value to km/h.

$$\frac{196 \text{ mi}}{\text{h}} \times \frac{1.609 \text{ km}}{1 \text{ mi}} = 315 \frac{\text{km}}{\text{h}}$$

. Practice

For an experiment you need 25 mg of NaCl, how many grams are there in 25 mg of NaCl?

$$25 \text{ mg NaCl} \times \frac{10^{-3} \text{ g}}{1 \text{ mg}} = ?$$

. Practice

Convert 150 g to kg

$$150 \text{ g} \times \frac{1 \text{ kg}}{10^3 \text{ g}} = ?$$

. Practice

Convert 25 mg to g

Solutions

. Practice

A Nissan GTR R35 has a top speed of 196 mph. Convert this value to km/h.

$$\frac{196 \text{ mi}}{\text{h}} \times \frac{1.609 \text{ km}}{1 \text{ mi}} = 315 \frac{\text{km}}{\text{h}}$$

. Practice

For an experiment you need 25 mg of NaCl, how many grams are there in 25 mg of NaCl?

$$25 \text{ mg NaCl} \times \frac{10^{-3} \text{ g}}{1 \text{ mg}} = 0.025 \text{ g NaCl}$$

. Practice

Convert 150 g to kg

$$150 \text{ g} \times \frac{1 \text{ kg}}{10^3 \text{ g}} = 0.15 \text{ kg}$$

. Practice

Convert 25 mg to g

$$25 \text{ mg} \times \frac{10^{-3} \text{ g}}{1 \text{ mg}} = 0.025 \text{ g}$$